TREFILOV, I., yurist

Social insurance payments during temporary transfer to other work. Okhr. truda i sots. strakh. 4 no.9:36-37 S '61.
(MIRA 14:10)

(Insurance, Social)

~~GOROKHOVSKIY, Boris Parmovich~~ TREFILOV, I. M.

Pensionnoye obespecheniye v SSSR; v voprosakh i otvetakh (Providing pensions in the USSR, by) B. P. Gorokhovskiy i I. M. TREFILOV. Moskva, Moskovskiy Rabochiy, 1957.

177 p. tables.

TREFILOV, Ivan Mitrofanovich; DENISOVA, I.S., red.; SHADRINA, N.D., tekhn.red.

[Calculation of aid for temporary disability] Ischislenie posobii po vremennoi netrudosposobnosti. Izd.2., ispr. i dop. Moskva, Izd-vo VTsSPS. Profizdat, 1959. 103 p. (MIRA 13:4)

(DISABILITY EVALUATION)

BATYGIN, Konstantin Stepanovich; LIRTSMAN, Mikhail Isaakovich; ~~TREFILOV, Ivan Mitrofanovich~~; DENISOVA, I.S., red.; MARKOCH, K.Ye., tekhn. red.

[State insurance allowances; commentary on the legislation in effect]Posobiia po gosudarstvennomu strakhovaniiu; kommentarii k deistvuiushchemu zakonodatel'stvu. 2., dop. izd. Moskva, Profizdat, 1962. 320 p. (MIRA 16:3)
(Insurance)

TREFILOV, Ivan Pavlovich

[How to interest students of the secondary schools in mathematics]
Kak zainteresovat' matematikoi uchashchikhsia serdnei shkoly.
Moskva, Gos. uchebno-pedagog. izd-vo, 1957. 44 p. (MIRA 11:4)
(Mathematics--Study and teaching)

TREFILOV, L.N.

Investigating the freeing of bast fibers. Izv. vys. ucheb. zav.; tekh. tekst. prom. no.5:54-58 '59 (MIRA 13:3)

1. Kostromskoy tekstil'nyy institut.
(Bast)

TREFILOV, L.N.

Investigating the process of freeing the fibers from retted ambary hemp straw. Izv.vys.ucheb.zav.; tekh.tekst.prom. no.3:35-37 '60. (MIRA 13:7)

1. Kostromskoy tekstil'nyy institut.
(Retting) (Ambary hemp)

TREFILOV, M.

Superelevation of the outer rail at curves. p. 478.

REVISTA CAILOR FERATE. (Caile Ferate Romine) Bucuresti, Rumania. Vol. 7, no. 9, Sept. 1959.

Monthly list of East European Accessions (EEAI) LC Vol. 9, no. 2, Feb. 1960

Uncl.

MARCUS, St., ing.; TREFILOV, M., ing.

Soil stabilization by means of lime and cement. Rev cailor fer 11 no.9:516-521 S '63.

TREFILOV, M.

Muddy ties. p. 581.

REVISTA CAILOR FERATE. (Caile Ferate Romine) Bucuresti, Rumania.
Vol. 6, no. 11, Nov. 1958.

Monthly List of East European Accessions (EEAI) IC, Vol. 8, no. 7, July 1959

Uncl.

BARABANSHCHIKOV, A.V., podpolkovnik, kand. pedag. nauk; GALKIN, M.I., polkovnik, kand. fil. nauk; D'YACHENKO, M.I., podpolkovnik, kand.ped.nauk,dots.; KOTOV, N.F., polkovnik,kand. ped.nauk; KOROBEYNIKOV, M.P., polkovnik, kand.ped.nauk; KRAVCHUN, N.S., kapitan 2 ranga, kand.ped.nauk, dots.; LUTSKOV, V.N., kand. ped. nauk, podpolkovnik; FEDENKO, N.F., kapitan, kand. ped. nauk, dots.; SHELYAG, V.V., kapitan 1 ranga, kand. fil.nauk; VOSTOKOV, Ye.I., general-mayor, kand. ist. nauk; KUBASOV, A.F., general-leytenant zapasa, red.; BELOUSOV, G.G., general-mayor, red.; TREFILOV, N.F., kapitan 2 ranga, red.; MURASHOVA, L.A., tekhn.red.

[Fundamentals of military pedagogy and psychology; a training aid] Osnovy voennoi pedagogiki i psikhologii; uchebnoe posobie. [By] A.V.Barabanshchikov i dr. Moskva, Voenizdat, 1964. 383 p. (MIRA 17:2)

SKRYL'NIK, Aleksandr Iosifovich; TREFILOV, N.F., red.

[Morals and the discipline of the soldier] Nravstvennost' i distsiplina voina. Moskva, Voenizdat, 1964. 95 p. (MIRA 17:12)

ASTASHENKOV, P.T., inzh.-polkovnik; TREFILOV, N.F., kapitan 2 ranga, red.; CHAPAYEVA, R.I., tekhn. red.

[Military engineer is an energetic teacher]Voennyi inzhener - aktivnyi vospitatel'; sbornik statei i ocherkov. Moskva, Voenizdat, 1962. 126 p. (MIRA 15:10)

(Military engineers)

TSAREV, F.I., polkovnik; TREFILOV, N.F., kapitan 2 ranga, red.;
CHAPAYEVA, R.I., tekhn. red.

[Combat honor is dear to us; training the youth of the army and the navy in combat traditions] Boevaia chest' nam doroga; vospitanie armeiskoi i flotskoi molodezhi na boevykh traditsiiakh. Moskva, Voenizdat, 1962. 114 p. (MIRA 15:7)
(Military education)

TOBURDANOVSKIY, A.N.; TREFILOV, P.S.

Method for intensive short-term tree tapping. Gidroliz. i lesokhim. prom. 17 no.6:13-14 '64. (MIRA 17:12)

1. TSentral'nyy nauchno-issledovatel'skiy i proyektnyy institut lesokhimicheskoy promyshlennosti.

TREFILOV, P.S.

Use of chemicals in tree tapping and their effect on the vital activity and growth of woods. Gidroliz.i lesokhim. prom. 13 no.4:20-21 '60. (MIRA 13:7)

1. TSentral'naya zonal'naya opytnaya stantsiya podsochki TSentral'nogo nauchno-issledovatel'skogo lesokhimicheskogo instituta.

(Tree tapping)

LUKOV, Grigoriy Dem'yanovich, kand. pedagog. nauk, dotsent, polkovnik zapasa; TREFILOV, N.F., kapitan 2 ranga, red.; KUZ'MIN, I.F., tekhn. red.

[Training the will of Soviet soldiers] Vospitanie voli u sovetskikh voinov. Moskva, Voen.izd-vo M-va obor. SSSR, 1961. 94 p. (MIRA 15:2)

(Will) (Morale) (Military education)

KORSHUN, A., uchitel'-pensioner (Gor'kovskaya obl.); TREFILOV, S. ; MOSKALEV, I.; STRELKOV, L.; MAZUROV, P.

Reader's letters. Pozh.delo 9 no.10:32 O '63. (MIRA 16:12)

1. Nachal'nik inspektsii Gosudarstvennogo pozharnogo nadzora, Glazovskiy rayon, Udmurtskaya ASSR.

KUZ'MINOV, I.I., red.; KLEPACH, N.Ya., red.; SLASTENENKO, V.A., red.; TREFILOV, V.A., red.; VORONINA, N., red.

[Socialist production collective] Sotsialisticheskii proizvodstvennyi kollektiv. Moskva, Mysl', 1964. 230 p. (MIRA 18:3)

1. Moscow. Akademiya obshchestvennykh nauk.

TREFILOV, V. I.

USSR/Physics

Card : 1/1

Authors : Gridnev, V. N., and Trefilov, V. I.

Title : The reversibility of Martensite conversions during heating of ferro-carbon alloys

Periodical : Dokl. AN SSSR, 96, Ed. 4, 741 - 743, June 1954

Abstract : Describes experiments through which the existence of Martensite reversible conversions for the iron-carbon system was shown. Seven references. Graphs.

Institution : ...

Presented by: Academician G. V. Kurdyumov, March 3, 1954

Translation B-82533, 2 Feb 55

TREFILOV, V. I.

TREFILOV, V. I.: "Investigation of phase transformationsin the thermal working of alloys, using increased rates of heating and cooling". Kiev, 1955. Min Higher Education USSR. Kiev Order of Lenin Polytechnic Inst. (Dissertations for the Degree of Candidate of Technical Sciences.)

So: Knizhnaya letopis' No. 49, 3 December 1955. Moscow.

137-58-6-13270

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 300 (USSR)

AUTHORS: Gridnev, V.N., Trefilov, V.I.

TITLE: On the Thermodynamics of Martensite Transformations (K termodinamike martensitnykh prevrashcheniy)

PERIODICAL: Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, 1957, Nr 8, pp 29-41

ABSTRACT: The mechanism of self-retardation of martensite transformation is discussed. Assuming that retardation is caused by omnilateral compression of retained austenite [Shteynberg, S.S., Izbrannyye stat'i (Selected Articles). Mashgiz, Moscow, 1950] it is stated that the retardation is caused by a decrease in the difference between the thermodynamic potentials of the austenite by the forming of a martensite framework. An equation connecting the degree of transformation M and the overcooling relative to the martensite point T_H, is obtained in the form $m^2 = K(T_H - T)$. The fact of increasing compression of the retained austenite during a decrease in temperature (to $-180^{\circ}C$) is confirmed by measuring the austenite-lattice spacing in tempered steel containing 0.84% C, 16.1% Ni, and 1.8% Mn;

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137-58-6-13270

On the Thermodynamics of Martensite Transformations

after various degrees of cooling below the T_H point, the spacing of the austenite lattice is $\approx$ 3.595 angstrom; upon cooling to -50° and formation of 50% martensite it is $\approx$ 3.590 angstrom, and after cooling to -18° it is $\approx$ 3.585 angstrom.

D.B.

1. Martensite--Thermodynamic properties 2. Steel--Transformations 3/ Austenite--Metallurgical effects

Card 2/2

TREFILOV V.I.

20-1-16/44

AUTHORS: Grinev, V.N., Trefilov, V.I.

TITLE: On the Relation between the Parameters of the Crystal Lattice of Austenite with a Temperature at which Martensite Transformation Begins in Alloys of Iron and Carbon (O svyazi parametrov kristallicheskoy reshetki austenita s temperaturoy nachala martensitnogo prevrashcheniya v splavakh zheleza s uglerodom)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 1, pp. 60 - 62 (USSR)

ABSTRACT: First, several previous works dealing with this subject are mentioned. According to thorough investigations carried out, the lattice parameter of austenite in martensite transformations depends a little upon the carbon content of the steel. According to the above mentioned previous work, the parameter of the remanent austenite changes on the occasion of martensite transformation from the martensite point to room temperatures only under the influence of temperature. However, the investigation of the martensite transformation points in the direction of yet another factor which has hitherto not been considered: From the beginning of the transformation onwards needle-shaped martensite plates are formed in the course of continuous cooling, which

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20-1-16/44

On the Relation between the Parameters of the Crystal Lattice of Austenite with a Temperature at which Martensite Transformation Begins in Alloys of Iron and Carbon

gradually form a very firm skeleton structure. In the cut out places and cells of this skeleton the not transformed remanent austenite remains. Martensite transformation is accompanied by a positive volume effect. Interesting data in this respect may be found in the paper by Vefer et al. (ref.4). The parameter of the austenite changes considerably at the temperature at which the transformation of martensite begins and with an increase of the carbon content of the steel. The attempt made by the authors to determine data concerning the compression of austenite on the occasion of the transformation of martensite is discussed in short. The thus found dependence of the parameters of austenite on the quantity of the martensite formed is illustrated in form of a table. The direct data obtained in this way confirm the compression of the austenite under the effect of martensite transformation. There are 4 figures, 1 table and 6 references, 4 of which are Slavic.

PRESENTED: April 17, 1957, by G.V.Kurdyumov, Academician
SUBMITTED: December 20, 1956
AVAILABLE: Library of Congress

GRIDNEV, V.N. [Hridniev, V.N.]; TREFILOV, V.I.

Phase changes in steel during electric tempering [with summary in English]. Ukr. fiz. zhur. 3 no.6:796-801 N-D '58.
(MIRA 12:6)

1. Institut metallofiziki AN USSR.
(Steel--Metallography) (Tempering)

TREFILOV, V.I.

18(7) PHASE I BOOK EXPLOITATION SOV/3355

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. IV (Studies on Heat-resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Errata slip inserted. 2,200 copies printed.

Ed. of Publishing House: V. A. Klimov; Tech. Ed.: A. P. Guseva; Editorial Board: I. P. Bardin, Academician; G. V. Kurdyumov, Academician; N. V. Ageyev; Corresponding Member, USSR Academy of Sciences; I. A. Oding, I. M. Pavlov, and I. P. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgists concerned with the structural metallurgy of alloys.

COVERAGE: This is a collection of specialized studies of various problems in the structural metallurgy of heat-resistant alloys. Some are concerned with theoretical principles, some with descriptions of new equipment and methods, others with properties of specific materials. Various phenomena occurring under specified conditions are studied and reported on. For details, see Table of Contents. The articles are accompanied by a number of references, both Soviet and non-Soviet.

Studies (Cont.) SOV/3355

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TREFILOV, V. I.

18(4,7); 25(1) PHASE I BOOK EXPLOITATION SOV/2306

Akademiya nauk Ukrainskoy SSR. Institut metallofiziki

Voprosy fiziki metallov i metallovedeniya (Problems in the Physics of Metals and Metallography) Kiyev, Izd-vo AN Ukrainskiy SSR, 1959. (Series: Its: Sbornik nauchnykh rubot, Nr 9) Errata slip inserted. 3,000 copies printed.

Ed. of Publishing House: V.L. Shkurko; Tech. Ed.: M.I. Yefimova; Editorial Board: V.N. Svechnikov, Academician, Academy of Sciences, Ukrainian SSR (Resp. Ed.); S.D. Gertsriken, Doctor of Physical and Mathematical Sciences; and I.Ya. Dekhtyar, Doctor of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers, aspirants, and engineers in the fields of the physics of metals, metallography, and metallurgy. It may also be useful to students of advanced courses in metallurgical and physical faculties.

COVERAGE: This collection of articles deals with the following topics: effect of high-speed heating, heat treatment, deformations, and crystallization conditions on phase transformations, structures, and properties of metals and alloys; the effect of additional alloying components on volumetric and intercrystalline diffusion in alloys; and the effect of repeated quench hardening and radioactive and ultrasonic treatment on the physical properties of alloys. No personalities are mentioned. References follow several of the articles.

Larikov, L.N., and I.G. Polotskiy. Problem of the Effect of Ultrasonics on Phase Transformations of Carbide Metals and Alloys 50

This article presents a study of the effect of ultrasonic treatment on the aging process of duralumin and an alloy composed of lead and 6 percent tin. Data obtained are presented in diagrams.

Gridnev, V.N. Effect of High-speed Heating on the Structure and Properties of Steel 54

The author describes an experimental investigation in which special devices were used for the simultaneous recording of time, temperature, elongation, and changes of voltage and amperage. Data presented in the article were obtained at the Laboratory for Heat Treatment, Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute), and at the Institut metallofiziki, AN USSR (Institute for the Physics of Metals, Academy of Sciences, UkrSSR).

Gridnev, V.N. and V.I. Trefilov. Metastable Transformations in Eutectic Cu-Al Alloys 68

The mechanism and kinetics of phase transformations are discussed in this paper. Simultaneous motion picture recording with oscillographic measuring of temperature made possible the accurate determination of all parameters investigated. The technique used in the experiment is described, and transformations are presented in the form of photographs and diagrams.

Gridnev, V.N., V.I. Trefilov, and A.S. Drachinskiy. Change in Mechanical Properties of Ti-Fe Alloys Due to Heat Treatment 82

Low-alloy Ti-Fe samples (2.9mm. diameter, 22mm. long), sintered, forged, and machined, were used. Results are shown in diagrams.

Bytylenko, A.K., V.N. Gridnev, and V.I. Trefilov. Changes in Structure and Properties of Powder Titanium During Vacuum Rolling 89

Samples of titanium IMP-1, made at the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy) and rolled in the laboratory vacuum mill there, were subjected to micro- and X-ray structural analysis and mechanical testing at room temperature. Results are discussed and conclusions drawn.

Gridnev, V.N., and V.T. Cherepin. Phase Transformations in Carbon-free Iron Alloys During Electric Heating 98

This article presents a study of changes from alpha to gamma iron, dilatation, the critical point, and the Curie point for various iron base alloys (Fe-Cu, Fe-W, Fe-Ti, Fe-Ni, Fe-Cr, and Fe-Si) in the annealed as well as the quenched state at varying rates of temperature change (500 to 4000°C per second).

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SOV/180-59-2-11/34

AUTHORS: Gridnev, V.N. and Trefilov, V.I. (Kiyev)

TITLE: Structural Changes During Electrical Tempering of Steel (Strukturnyye izmeneniya pri elektrootpuske stali)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 2, pp 62-69 (USSR)

ABSTRACT: The work described, in some of which D.V. Lotsko and N.F. Chernenko participated, was carried out with types U8A and U12A carbon steel. Specimens 1.2 to 1.6 mm in diameter were subjected to hardening from temperatures ensuring solution of secondary cementite in water followed by supercooling in liquid air to reduce the residual-austenite content. The specimens were then subjected to electric tempering by the contact method with heating rates varying from hundreds to several thousand degrees per second. As soon as the required temperature had been reached the current was switched off and the specimens were quenched with water with cooling rates of 2500 to 3000 °C/sec. During heating oscillographic recordings were made of the heating and dilatometric curves. For comparison some of the supercooled specimens were subjected to ordinary tempering for an

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hour at various temperatures. Changes in block structure and second-type internal distortions were studied with the aid of X-ray structural analysis, calculations being made from the line-thicknesses according to methods developed by G.V. Kurdyumov and L.I. Lysak (Refs 1-3). The choice of lines depended on tempering temperature. The changes in second-order distortions depending on the temperature for various speeds of tempering are shown in Figs 1 and 2 for U12A and U8A steels, respectively. The effect of the electric compared with ordinary tempering was to delay the distortion-relation processes and the growth of alpha-phase blocks. Rapid cooling for the prevailing experimental conditions had practically no effect on results. With low and medium tempering temperatures some differences between the two steels appeared. Figs 3, 4 and 5 shcw the block dimension as functions of temperature and electric-tempering temperature for U12A and U8A steels, respectively. Comparison of electric tempered with an 80% deformed (by drawing) specimen showed that for U12A steel the same changes in distortion and block size could be obtained by electric

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tempering at 580 - 620 °C, at 1000 - 10000 °C/second. Static distortion of the third-type was also studied to provide further comparative information. It has been shown that this type accounts for about all deformation-produced increase in energy of metal. The authors measured these distortions by methods described in the literature with X-ray photography at room temperature and neglecting changes in dynamic distortion. The tabulated results of some measurements show that the magnitude of static third-type distortion in steel subjected to electric tempering to temperatures up to approximately 650°C is very similar to that in work-hardened metal. Discussing the influence of electric tempering on hardness phenomena the authors mention their conclusive experimental proof that only a ferrite-carbide mixture is present in specimens quenched from temperatures over 600°C. They have also found that in such specimens the third-type distortions are of similar magnitude to those produced by strong plastic deformation. The authors discuss the relation between block size and third-type distortions. They deduce an equation for the

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relative elongation to fracture in terms of a coefficient characterizing the material, a lattice parameter, grain diameter, Poisson's ratio and a coefficient representing the form of dislocation fixing. Fig 6 shows the relations graphically while Fig 7 gives test results which confirmed the relations deduced. These and the results of hardness determinations for U12A and U8A steels (shown in Figs 8 and 9 respectively as functions of electric-tempering temperatures) confirm the superior properties produced by electric tempering. The authors suggest that further investigations are necessary, especially on its possible use instead of alloying. There are 9 figures, 1 table and 17 references, 13 of which are Soviet and 4 English.

Card 4/4

SUBMITTED: January 9, 1958

GRIDNEV, V.N. [Hridniev, V.N.]; MINAKOV, V.N.; TREFILOV, V.I.;

Resistance of metals to deformation during phase transformation.
Ukr.fiz.zhur. 4 no.4:526-527 Jl-Ag '59. (MIRA 13:4)

1. Institut metallofiziki AN USSR.
(Deformations (Mechanics)) (Metals)

BUTYLENKO, O.K.; KURDYUMOVA, I.G. [Kurdiumova, I.H.]; TREFILOV, V.I.

Determining the activation energy of chromium recrystallization.
Ukr.fiz.zhur. 4 no.6:813-814 N-D '59. (MIRA 14:10)

1. Institut metallofiziki AN USSR.
(Chromium crystals)

GRIDNEV, V.N.; RAFALOVSKIY, V.A.; TREFILOV, V.I.; CHERNENKO, N.F.

Phase and structural changes in heating Ti-Cr alloys. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.10:77-85 '59. (MIRA 13:9)
(Titanium-chromium alloys--Metallography)
(Metals, Effect of temperature on)

GRIDNEV, V.N.; TREFILOV, V.I.

Carbide phase in carbon steels during electric tempering. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.10:86-93 '59. (MIRA 13:9)
(Steel--Heat treatment) (Phase rule and equilibrium)

GRIDNEV, V.N.; PETROV, Yu.N.; TREFILOV, V.I.

Electron microscopy of the carbide phase produced by tempering and electric tempering of carbon steels. Sbor. nauch. rab. Inst. metallogiz. AN URSR no.10:94-103 '59. (MIRA 13:9)
(Electron microscopy) (Steel--Heat treatment)
(Phase rule and equilibrium)

GRIDNEV, V.N.; TREFILOV, V.I.

Microstructure of martensite in tatanium-chromium alloys. Titan i ego splavy no.3:58-60 '60. (MIRA 13:7)
(Titanium--Chromium alloys) (Martensite)

GRIDNEV, V.N.; TREFIIOV, V.I.; CHERNENKO, N.F.

Transformations during the electric heating of commercial titanium in titanium-iron alloys. Titan i ego splavy no.3:61-65 '60.
(Titanium-iron alloys--Heat treatment) (Titanium--Metallography)

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18.1285 1413, 1418, 4016

AUTHORS: Gridnev, V. N. Petrov, Yu. N., Rafalovskiy, V. A. and Trefilov, V. I.

TITLE: Investigating the ω-phase formation in titanium alloys

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 11. 1960. Voprosy fiziki metallov i metallovedeniya, 82-86

X

TEXT: The authors investigated, by electron microscopy and electron diffraction, formation of the ω-phase in Ti-Cr and Ti-Fe alloys. The alloys were prepared in an arc furnace filled with argon and were then forged and annealed. The ω-phase was produced by quenching in the alloys with 5 or 8% Cr and with 5% Fe; the ω-phase particles were highly dispersed at random, and they could be easily separated from the matrix in the Ti-5% Fe

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alloy. In the alloys with 12% CR or 8% Fe, quenching produced the β-phase in supercooled state; isothermal treatment at 200 - 350°C decomposed this β-phase into the ω-phase and a Cr-rich β-phase. Such isothermal treatment increased the sample length and its hardness. The ω-phase particles grew in size during the isothermal treatment, and the rate of growth indicated a noncoagulation process. The dimensions of the ω-particles did not exceed 1200 - 1600 Å; beyond this size, the $\omega \rightarrow \beta + \alpha$ transformation took place. The ω-particles produced by the isothermal treatment were concentrated along the grain boundaries of the β-phase. Further experiments showed that the ω-phase was formed also by 20 - 25% plastic deformation of the 12% Cr or 5% Fe alloys, but cooling to -196°C did not produce the γ-phase in the 12% Cr or 8% Fe samples. These experimental observations were accounted for by a theory of the ω-phase formation which unifies the suggestions of (1) martensite-type diffusionless transformation and (2) decomposition of a metastable

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solid solution with the ω-phase as an intermediate stage. There are 5 figures and 9 references: 3 Soviet-bloc and 6 non-Soviet-bloc. The reference to the English-language publication reads as follows: F. Brotzen, E. Harmon, A. Troiano, J. of Metals, 5, no. 2, 2, 231, 1953.

X

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S/601/60/000/011/013/014
D207/D304

AUTHORS: Minakov, V. N., Rudoy, A. P., and Trefilov, V. I.

TITLE: A dilatometer with a capacitance detector

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 11. 1960. Voprosy fiziki metallov i metallovedeniya, 158-159

TEXT: The authors describe a simple dilatometer with rapid response suitable for studies of phase transformations at high rates of heating. The detector is a capacitor with a movable (b) and fixed (a and c) electrodes (Fig. 1). The change of length of a sample is transformed into a change of capacitance by motion of the movable electrode. The two electrode systems (ab, cb) form parts of two separate oscillatory circuits working at or near resonance. The resonance is distributed when the

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A dilatometer with...

capacitances ab and bc are altered. This affects the natural frequencies of the circuits and the anode currents of a double triode 6H15П (6N15P). An induction coil L_2 and capacitances C_1 and C_2 form the grid circuit, while inductance L_1 and the the capacitance C_{cb} form the anode circuit of the left-hand part of the double triode. Both these circuits are loosely coupled, and the coils L_1 and L_2 are placed on the same axis. The grid circuit is tuned by means of C_2 so that any change of C_{cb} produces a directly proportional increase of the anode current. The oscillator on the right-hand side contains C_{ab} and is constructed in a similar fashion. The circuits are assembled from intermediate frequency filters of the audio parts of the "Rekord" television set. When the capacitances C_{ab} and C_{cb} are varied, the current in one triode increases and falls in the

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D207/D304

other. The difference current is passed through loop no. 8 of an oscillograph МПО-2 (MPO-2) connected between the triode anodes. The direct proportionality between the oscillator indication and the dilatometer displacement is obtained by suitable selection of the gap between the fixed electrodes a and c and of the working regions on the resonance curves of the oscillators. The instrument constructed by the authors has a linear characteristic for capacitor plate displacements of 0 - 1 mm. The instrument gives reliable dilatometric curves when used in conjunction with a loop oscillograph. The oscillograph readings are practically unaffected by the cathode drift and supply voltage variations. There are 2 figures and 2 Soviet-bloc references. [Abstracter's note: Essentially complete translation.]

SUBMITTED: September 15, 1959

Card 3/3

84469

S/020/60/134/006/012/031
B019/B067

18.7500

AUTHORS: Gridnev, V. N., Trefilov, V. I., and Minakov, V. N.

TITLE: Martensitic Transformation in the System Titanium - Zirconium

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 6, pp. 1334 - 1336

TEXT: The authors studied the temperature dependence of the martensitic transformation on the composition of the Ti-Zr alloy. Furthermore, they examined the existence of a reverse martensitic transformation. Iodides of both metals were used for the production of the alloys. The production method is described in detail. The apparatus used for the investigation of the phase transformation was described in Ref. 3. It allowed the simultaneous determination of temperature, dilatation curves, voltage drop in the sample, and the amperage of the current heating the sample. Heating to 950 - 1000°C was effected in quartz ampoules, quenching was carried out at a rate of 1000 - 1500°C/sec by previously crushing the ampoules in the water. The X-ray diffraction pattern showed

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Martensitic Transformation in the System Titanium - Zirconium

S/020/60/134/006/012/031
B019/B067

only a martensitic alpha prime phase; an undercooled beta phase could not be found. The authors arrive at the conclusion that the residual beta phase in the Ti-Zr alloy is the smaller the lower the amount of nitrogen and oxygen impurities in the alloy. The alpha prime phase has the characteristic martensitic structure, and the reverse martensitic transformation could be proved on heating ($500^{\circ}C/sec$). Fig. 2 graphically shows the transformation temperatures for direct and reverse martensitic transformations as a function of the composition of the alloy. In the range from 40 to 80 at%, the transformation temperature is independent of the composition. The authors conclude from the results that in the ranges from 0 to 40% Zr and from 80 to 100% Zr the transformation $\beta \rightarrow \alpha'$ takes place on quenching in water or in an argon jet. With accelerated heating the transformation $\alpha' \rightarrow \beta$ occurs. In the range from 40 to 80% Zr, the same transformations occur on quenching in water and on rapid heating. On cooling in the argon jet ($200 - 300^{\circ}C/sec$), however, $\beta \rightarrow \omega$ transformation occurs besides the transformation mentioned. Great significance is ascribed to the formation of the ω-phase in the Ti-Zr system, and it is discussed in detail. The results of other authors are described, and it is found that the difficulty in producing the ω-phase

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84659

Martensitic Transformation in the System Titanium - Zirconium

S/020/60/134/006/012/031
B019/B067

in the system investigated lies in the fact that the temperature of the $\beta \rightarrow \omega'$ transformation is below the temperature of direct $\beta \rightarrow \alpha'$ transformation. The ω-phase is formed on undercooling a certain amount of the β-phase to the temperature of formation of the ω-phase. Yu.A.Bagaryatskiy (Refs. 5 and 6) is mentioned. There are 3 figures and 8 references: 3 Soviet, 3 US, 1 German, and 1 British.

ASSOCIATION: Institut metallofiziki Akademii nauk USSR (Institute of Metal Physics of the Academy of Sciences UkrSSR)

PRESENTED: May 25, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: March 22, 1960

Card 3/3

27032
S/125/61/000/004/001/013
A161/A127

1.2300
18.1285

AUTHORS: Grabin, V. F., Gurevich, S. M., Rafalovskiy, V. A., Trefilov, V. I.

TITLE: Investigation of aging processes in welds on biphase titanium alloys. Instalment I - Aging of welds in the post-welding state

PERIODICAL: Avtomaticheskaya svarka, no. 4, 1961, 3 - 12

TEXT: The purpose of the described investigation was to compare aging processes in biphase titanium alloys with different additions of β-stabilizers. Welds were studied in the as-welded state, and after heat treatment. The three experiment alloys were the commercial BT6 (VT6) with 6.1% Al and 4.1% V, and two test alloys designated no. 1 and containing 2.5% Al, 9.7% V and 3.8% Mn, and no. 2 - with 6.34% Mn. The investigation methods were the following: metallographic, electron-microscopic, X-ray, dilatometric, measurement of electric resistance and hardness, and tests for mechanical properties. Collodium, carbon and silver-carbon prints were used for examination with the УЭМ-100 (UEM-100) electron microscope. The phase composition was determined roentgenographically with copper radiation and nickel filters. The differential vacuum dilatometer had been described formerly [Ref. 11: V. F. Grabin, V. G. Vasil'yev, V. A. Rafalovskiy, "Avtom. svarka",

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27032

S/125/61/000/004/001/013
A161/A127

Investigation of aging processes in welds on...

no. 3, 1960]. The electric resistance was measured in a high-temperature vacuum unit. Heating for heat treatment and artificial aging was produced in evacuated quartz ampoules. Welded specimens were prepared by joining 3 to 6 mm thick sheets by butt welding with electrodes of the same metal as the base metal, by submerged arc with АН-Т1 (AN-T1) flux. The article presents the first part of results - obtained with welds that were not heat-treated. Graphs and electron microscope photo-micrographs are included. The formation of the phase omega was observed in the no. 2 alloy only (Ti-Mn), directly after the welding. The test results confirmed previous conclusions concerning the stability of welds on VT6 alloy [Ref.14: S. M. Gurevich, V. F. Grabin, "Avtom. svarka", no. 4, 1959]. The article includes references to Soviet-bloc and non-Soviet-bloc publications in connection with data on embrittlement in titanium alloy welds. Conclusions: 1) The possibility of ω-phase formation in weld metal and the adjacent heat-affected zone in binary Ti-Mn alloys (no. 2) has been experimentally proven. The formation of this phase directly after welding causes embrittlement. 2) The ω-phase seen in the electron microscope has the shape of round or oblong segregations that are distributed non-uniformly. The segregations were, as a rule, observed inside grains. 3) The ω-phase was not found in welds that contained β-stabilizers (vanadium and manganese aggregate content as in the no. 1 alloy), and an α-stabilizer (aluminum). But

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S/125/61/000/004/001/013
A161/A127

Investigation of aging processes in welds on...

weld metal alloyed with manganese alone was highly prone to aging accompanied with the formation of ω-phase. 4) Aging was most intensive in the 200 - 450°C temperature range. Long isothermic soaking (to 100 hours) did not eliminate brittleness, which is apparently caused by the α-phase segregation on grain boundaries as a result of the $\beta + \omega \rightarrow \beta + \alpha$ transformations. 5) Welds in the VT6 alloy in the post-welding state are sufficiently stable and do not embrittle in artificial aging in the 200 - 500°C range. Hence it is wrong to use high-temperature treatment for the VT6 alloy welds when the required strength is not above 100 kg/mm^2. Tempering for stress relief will be sufficient. There are 6 figures, 3 tables and 14 references: 4 Soviet-bloc and 10 non-Soviet-bloc. The references to the four most recent English-language publications read as follows: E. L. Harmon, I. Koozol, A. R. Troiano, Mechanical Properties Correlated with Transformation Characteristics of Titanium-Vanadium Alloys, "Trans. Amer. Soc. Metals", v. 50, 1958; A. I. Griest, I. R. Doing and P. D. Frost, Correlation of Transformation Behaviour with Mechanical Properties of Several Titanium-Base Alloys, "Trans. Met. Soc. Amer. Inst. Min.", "Metal Eng.", 215, 1959; R. W. Douglass, F. C. Holden, H. R. Ogden and R. T. Yaffee, Effect of Microstructure on the Mechanical Properties of Ti-V, Ti-Al-V Alloys, "Journal of Metals", v. 12, no. 1, 1960; A. I. Griest, A. P. Joung, A Study of Beta Embrittlement in High-Strength Titanium Alloys, "Battelle Mem. Institute", 1958.

Card 3/4

27032

Investigation of aging processes in welds on... S/125/61/000/004/001/013
A161/A127

ASSOCIATION: Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye. O. Patona AN USSR ("Order of the Red Banner of Labor" Electric Welding Institute im. Ye. O. Paton AS UkrSSR) (V. F. Grabin and S. M. Gurevich); Institut metallofiziki AN USSR (Institute of Physics of Metals AS UkrSSR) (V. A. Rafalovskiy and V. I. Trefilov)

Card 4/4

S/137/62/000/008/038/065
A006/A101

AUTHORS: Gridnev, V. N., Trefilov, V. I., Lotsko, D. V., Chernenko, N. F.

TITLE: On the mechanism of phase transformations in Ti-Cr alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 8, 1962, 36, abstract 8I221 ("Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR", 1961, no. 12, 37 - 45)

TEXT: Ti-alloys containing 0.5 - 10.5% Cr were melted in an arc furnace. From the ingots, wire, 1.6 - 1.8 mm in diameter, was manufactured after forging. During the electric heating of the specimens, temperature and dilatometric curves, and the dropping of the current voltage and intensity were recorded. The alloys were quenched in an argon jet at 200 - 300 degree per second cooling rate. The quenched alloys, containing up to 5 - 5.5% Cr, have an α'-phase structure. At a higher Cr-content the temperature of martensite transformation decreases abruptly. During the heating of quenched alloys reverse transformation takes place according to martensite kinetics. The temperature of reverse transformation depends only on the Cr content and not on the heating rate (150 - 3,000 degree/sec).

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S/137/62/000/008/038/065
A006/A101

On the mechanism of phase transformations in...

In alloys with 5.5 - 6% Cr, ω-phase is formed. The temperature of ω-phase formation is about 310°C and does not depend on the composition or the cooling rate. The temperature of reverse transformation $\omega \rightarrow \beta$ is by 80 - 100°C higher and also depends neither on the composition nor the cooling rate. The growing crystals of the martensite phase cause the formation of martensite crystals in the adjacent grain when they encounter the grain boundary; the magnitude of the crystals depends upon the dynamic collision force. The domain structure of martensite needles is noted. The authors studied also the $\alpha \rightarrow \beta$ transformation occurring during the heating of annealed alloys. It was established that it begins at 850 ± 10°C independent of the heating rate and the Cr content. There are 10 references.

P. Novik

[Abstracter's note: Complete translation]

Card 2/2

22937
S/125/61/000/006/001/010
D040/D112

1.1710 also 2708

AUTHORS: Grabin, V. F., Gurevich, S. M., Rafalovskiy, V. A., Trefilov, V. I.

TITLE: Investigation of ageing processes in biphase titanium alloy welds. II installment. - Ageing of heat treated welds

PERIODICAL: Avtomaticheskaya svarka, 14, no. 6, 1961, 3-13

TEXT: Results of investigation of the structure and mechanical properties of titanium alloy welds in the initial state were presented by the authors in instalment I (Ref. 3: "Avtom.svarka", no. 4, 1961). The II instalment presents the results of investigations made after heat treatment consisting in heating specimens to 800-900°C, quenching in water, and subsequent ageing at 200-600°C in evacuated quartz ampoules. The studied alloys were commercial BT 6 (VT6)(Ti-Al-V system) and two experimental compositions - No. 1 (Ti-Al-V-Mn) and No. 2 (Ti-Mn). The reason for the investigation is the ever more extensive application of high-strength biphase titanium alloys for welded structures, and the embrittlement in welds. The chemical composition and properties of the three studied alloys were given in Ref. 3. The

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S/125/61/000/006/001/010
D040/D112

Investigation of ageing processes ...

ageing process was studied by measurements of hardness, electric resistance and thermal expansion, and with X-ray and electron microscope observations. The results are discussed with references to data of seventeen other works, Soviet and foreign. The minimum hardness was established in VT6 alloy welds with the lowest quantity of (10%) after quenching; in mixed and structure it reached 550-600 Hv. Maximum hardness was reached faster at a higher ageing temperature. In VT6 the maximum hardness depended only little on the quenching temperature, but in the No. 1 and 2 alloys this dependence was more pronounced. The formation of upon isothermic decomposition was accompanied by volume reduction of specimens and change of the sign of the temperature coefficient of electric resistance. After sufficiently long holding periods decomposed forming dispersed particles; this was accompanied by a reduction in hardness and an increase in the volume and plasticity of the specimen. Decomposition of above 400-450°C was characterized by C-curves similar to those of the pearlitic decomposition of supercooled austenite (Fig. 2), but the start of separation had not the characteristical C-shaped line, for some amount of → transformation took place even at very rapid heating (up to 3000°C/sec, in alloys with a -composition close to critical electronic concentration). The high-hardness stage

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Investigation of ageing processes ...

passed very rapidly when the ageing temperature was sufficiently high, thus hardness decreased during isothermic soaking at 600°C. No sufficient homogeneity was obtained by heating to 800°C for quenching, for this temperature is near the upper limit of the biphase ($\alpha + \beta$) range. At 900°C homogenation is already possible, and the β-phase becomes less alloyed and decomposes faster in ageing. Contrary to the opinion of some foreign authors, it had previously been concluded by Soviet authors that at a certain electronic concentration in β the $\beta \rightarrow \omega$ transformation is without diffusion, and that the reverse martensite-like transformation (also diffusionless) could not be suppressed even by heating at a rate of several thousand degrees per second. This cannot be compared with the "reverse" in Co-Al alloys. The initial transformation in alloys whose β-phase structure has a near-critical electronic concentration must be presented as shown by the dotted line in Fig. 5, and not as it is presented usually. In alloys with omega already present after quenching, the initial $\beta \rightarrow \omega$ transformation line will be the same. As it is not possible to fix precisely the start of decomposition in the case of furnace heating, the specimens were heated by electric resistance in a high-speed dilatometer. They were heated for 1 - 1.5 sec, then soaked for 90 secs. The results show that no transformation took place in

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VT6 alloy, i.e. the specimens' length decreased only slightly, but in the No. 1 and No. 2 alloys the transformation was sharp and without any incubation period. It is important from the practical point of view to know the boundaries of the temperature range where the ω phase exists. The obtained data indicate that for the VT6 it is 180-420°C, and for No. 1 and No. 2 - 180-440°C. Seen under an electron microscope, the ω particles were mostly round. The included photomicrographs show no ω in No. 1 alloy welds after quenching (Fig. 7, a) (hardness was H_V 300-320); the No. 2 had a slight quantity of ω and high hardness (H_V 400). After 1 hr ageing at 350°C both alloys had clear round ω -phase particles 300-500 Å in size. Elongated 500-800 Å long particles were more rare. It is possible that they formed later, when the particles were only slightly growing. Long ageing ends with full transformation into alpha. In general, the data show that the quenching temperature should not be above 900°C as this reduces the plasticity of weld metal both after quenching as well as after ageing. Brief ageing of preliminarily quenched specimens raised the ultimate strength to 130 kg/mm^2 and considerably decreased the plasticity. Long ageing improved the plasticity of weld metal and only slightly decreased the strength, i.e. to 120 kg/mm^2. Conclusions. 1) The decomposition process of the metastable β -phase

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S/125/61/000/006/001/010
D040/D112

in hardened welds of VT6, No. 1 and No. 2 alloys has been investigated. The transformation kinetics of β in ageing of quenched welds in biphase titanium alloys is analogous with the β-decomposition in the weld metal and heat-affected zone after welding. The ageing process is faster in hardened welds than in welds not subjected to preliminary heat treatment. 2) Diagrams of metastable β-phase decomposition have been plotted for the No. 1 and 2 alloys, and the decomposition mechanism discussed. 3) The $\beta \rightarrow \omega$ transformation rate upon ageing of weld metal depends on the temperature of the preceding quenching. Lowering the quenching temperature from 900 to 800°C speeds up the ageing process in the VT6 alloy. In the No. 1 and 2 alloys the effect is opposite. 4) VT6 alloy welds are less prone to ageing than welds of No. 1 and 2 alloys, both after welding and after quenching. 5) Omega particles forming in the weld metal upon ageing are round, seldom elongated. Their respective size is 300-500 Å and 500-800 Å. 6) Quenching and subsequent long ageing of VT6 welds give an ultimate strength of up to 120 kg/mm^2 and satisfactory plasticity. There are 7 figures, 1 table and 17 references: 7 Soviet-bloc and 10 non-Soviet bloc. The four latest references to English-language publications read as follows: F. R. Brotzen, E. L. Harman and A. R. Troiano, Decomposition of Beta Titanium, "Journal of Metals",

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S/125/61/000/006/001/010
D040/D112

Investigation of ageing processes ...

v.7, No. 2, 1955; F. R. Brotzen, E. L. Harmon, A. R. Troiano, Trans. AIME, v. 203, 1955; R. T. Jaffee, Prog. Metal Phys., 7, Revue, 1958; I. M. Silcock, An X-ray Examination of the Phase in TiV, TiMo and TiCr Alloys, "Acta Metallurgica", No.7, 6, 1958.

ASSOCIATION: Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye. O. Patona AN USSR (Institute of Electric Welding "Order of the Red Banner of Labor" im. Ye. O. Paton AS UkrSSR) (V. F. Grabin, S. M. Gurevich); Institut metallofiziki AN USSR (Institute of Physics of Metals AS UkrSSR) (V. A. Rafalovskiy, V. I. Trefilov)

SUBMITTED: January 24, 1961

Card 6/8

S/032/61/027/002/018/026
B134/B206

AUTHORS: Minakov, V. N., Trefilov, V. I.

TITLE: Instrument for studying martensite transformations

PERIODICAL: Zavodskaya laboratoriya, v. 27, no. 2, 1961, 207-210

TEXT: An instrument for studying martensite transformations is described. It permits a determination of temperature during heating and cooling, the elongation of the sample, the potential drop in the sample, the amperage which passes the sample, as well as the taking of microfilm pictures of the sample surface during direct and reverse martensite transformations. A block circuit diagram of the instrument is given in Fig. 1, (1) being the time-limit relay, (2) the hardening mechanism (sample cooling with argon), (3) the electronic dilatometer (A. P. Rudoy cooperated in its elaboration), (4) electronic shielding of the loop oscilloscope, (5) a ferroresonance stabilizer, (6) sample, (7) МД-6 (MD-6) bridge, and (8) the dilatometer pickup. For studies of phase transformations at a rate of heating above 1000-1500°C/sec, the current frequency of the heater current

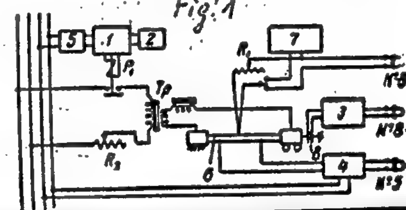
Card 1/3

of the sample is raised. The resistance stability of the thermocouples is maintained by a slide wire, and controlled by the MD-6 bridge. The maximum error in temperature measurement is $\pm 8^{\circ}C$ when an МПО-2 (MPO-2) oscilloscope is used. The dilatometric curve is obtained by means of a differential capacitance pickup which is connected to the anode lines of two generators with 6Н15П (6N15P) tubes. Through the capacitance variation of the pickup, the natural frequency of the generators changes and, thus, the anode currents of the triodes. A loop oscilloscope is connected between the anodes of the triodes, and records the difference of the anode currents of the generators. The potential drop in the sample during heating is recorded by a loop oscilloscope which is shielded by an electronic block. The voltage is fed to a rectifier (ДГЦ-27 (DGTs-27)tube). For various rates of heating, the maximum heating temperature is adjusted by a time-limit relay which contains a ТГ 1-01/1.3 (TG1-01/1.3) thyratron and an STV 280/80 stabilizer-divider. If the sample is to be hardened immediately after heating, the hardening mechanism is automatically switched on, and argon blown onto the sample whereby a cooling of 300°C/sec can be attained. Long-focus objectives

of the types ОСФ-16 (OSF-16) (from the МВТ (MVT) microscope) and "gomal' II" (from the МИМ-8 (MIM-8) microscope) were used for taking microfilm pictures. Magnification was 250x for pictures taken with a КС-50Б (KS50B) camera, and 64 pictures per second could be taken. An СКС-1 (SKS-1) movie camera was used for up to 4000 frames/sec. Some motion pictures of martensite transformations are mentioned in a paper by V. N. Gridnev and V. I. Trefilov (Ref. 1). A vacuum of 10^{-3}-2×10^{-5} mm Hg is maintained in the vacuum chamber containing the sample in order to prevent oxidation of the sample during heating. There are 6 figures and 6 Soviet-bloc references.

ASSOCIATION: Institut metallofiziki Akademii nauk USSR (Institute of Physics of Metals of the Academy of Science's Ukr SSR)

Fig. 1



APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756520002-3"

S/601/62/000/014/C01/012
I003/I203

AUTHORS: Gridnev, V. N. and Trefilov, V. I.

TITLE: A new metastable phase in alloys of transition elements (Ω-phase)

SOURCE: Akademiya nank Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 14. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya. 5-25

TEXT: The present article is the first attempt to generalize all available data on the mechanism and on the kinetics of the $\beta \rightarrow \omega$ trans formation and on the physical properties of these phases. Titanium alloys containing transition metals are widely used, but if the ω-phase is present the alloys are of little practical value because the ω-phase makes them highly brittle. It is emphasized that the ω-phase is an electron compound and that the $\beta \rightarrow \omega$ transformation is a diffusionless one of the martensitic type taking place at constant values electron-to-atom ratio. The authors take issue with the opinion expressed by certain Western scientists who consider that the formation of the ω-phase in the matrix of the overcooled β-phase is a result of diffusion processes. The formula

$$\sigma_s = A \frac{G - b}{\Gamma} \sqrt[3]{\beta}$$

shows the relationship between the shearing stress required to cause the crystall planes of an alloy to slip, and the amount and dispersity of the ω-phase in the β-phase matrix. The behaviour of the β-phases under different conditions and the mechanism of the plastic deformation of semiconductors are discussed. There are 11 figures and 1 table.

Card 1/1

S/601/62/000/015/010/010
A004/A127

AUTHORS: Gridnev, V.N., Lotsko, D.V., Trefilov, V.I., Chernenko, N.F.

TITLE: On the nature of changes in the physical properties of titanium alloys in the temperature range of 100 - 400°C

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 15. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya, 192 - 200

TEXT: The authors investigated phase transformations in titanium alloys containing additions of 2.3 and 5 weight % Al, 1.87 and 5 weight % Cr, 2.2 and 5 weight % Fe, 3 and 5 weight % Sn and also iodide titanium and titanium of commercial purity - grade BT-1 (VT-1). The alloys were melted in an arc furnace and by the induction drop-melting method in purified argon with triple remelting. They had the shape of bars 3.5 mm in diameter. Plastic deformation was effected by drawing. The degree of deformation was determined as the relative reduction in cross section. After processing under various conditions, the specimens were subjected to x-ray, electron-diffraction and electron-microscopic examination.

Card 1/2

S/601/62/000/015/010/010
A004/A127

On the nature of changes in the physical ....

The authors give a detailed report on the test results and come to the conclusion that the cause of the anomalous volumetric changes in titanium alloys in the temperature range of 100 - 400°C is the hydrogen ageing, which is considerably accelerated by deformation. According to available data (Tien-Shiuh liu, Morris A. Steinberg. Trans. ASM, 50, 455, 1958) the crystallographic planes of hydride separation are (1010), (1011), (1121) and (1012). These planes coincide with the possible glide planes and twinning planes in α-titanium at room temperature, which increases the sensitivity of the alloy to impact loads and causes an intense hydride separation in alloys subject to considerable plastic deformation. There are 7 figures and 2 tables.

SUBMITTED: June 25, 1961

Card 2/2

S/601/62/000/016/002/029
E111/E451

AUTHORS: Mil'man, Yu.V., Trefilov, V.I.

TITLE: Contribution on the brittle transition temperature of metals with a body-centered cubic lattice

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no.16. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya. 16-21

TEXT: The authors apply a mathematical treatment of dislocation theory to calculate the brittle transition temperature Tx for low-carbon steel and cast molybdenum. Their results agree well with experimental results for both materials. However, for considerably smaller block sizes calculated results are low. An increase in the speed of deformation from 10^{-4} sec^{-1} to 10^{2} sec^{-1} causes Tx to rise, the absolute increase (which can exceed 200°C) being much greater for molybdenum than for iron. This explains the profound effect of test conditions on the Tx values for molybdenum and the fact that its notch sensitivity is higher than that of steel. A decrease in grain size reduces Tx more in molybdenum than in steel; decrease in substructure size and
Card 1/2

S/601/62/000/016/002/029
E111/E451

Contribution on the brittle ...

increase in dislocation density reduces Tx for both materials. It is confirmed that by varying the substructure it should be possible to vary the transition temperature over a wide range. There are 2 figures and 2 tables.

SUBMITTED: January 27, 1962

Card 2/2

S/601/62/000/016/001/029
E193/E383

AUTHOR: Trefilov, V.I.

TITLE: Dislocation theory of brittle fracture

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 16. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya. 3 - 15

TEXT: A general equation for brittle fracture was obtained and found to be a special case of Stroh's equation. The solution of this equation yielded a formula:

$$T_x = \frac{\sigma_o - 0.75\ K\ell^{-1/2}}{\beta \ln\left[\frac{N'}{\dot{\varepsilon}}\left(\frac{\ell}{d}\right)^{1/2}\right]} , \qquad (16)$$

where T is the ductile-to-brittle transition temperature, $\dot{\varepsilon}$ the strain rate, d grain size, ℓ the size of the mosaic blocks and K, β and N' are constants; the stress σ_o is a measure of

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S/601/62/000/016/001/029
E193/E383

Dislocation theory ....

the force of interaction between a dislocation and the surrounding impurities and represents the structurally-insensitive components of the yield stress. The relationship between 1/T and log d obtained from formula (16) should be linear if all the other factors are constant; this has been confirmed experimentally for two steels. The validity of Eq. (16) was also confirmed by experimental data on the relationship between ε and 1/T. It has been shown that T is affected by preliminary plastic deformation of steel; this effect has been attributed to the effect of preliminary treatment on the substructure of the material. It was concluded that further studies on the subject should entail more rigorous analysis of the conditions and mechanism by which dislocations are removed from their atmospheres and calculation of the activation energy for the latter process. There are 5 figures and 1 table.

SUBMITTED: January 27, 1962

Card 2/2

DRACHINSKIY, A.S.; MOISEYEV, V.F.; TREFILOV, V.I.

Conditions of the start of flow and the failure of iron.
Sbor. nauch. rab. Inst. metallofiz. AN URSR no.18:18-21
'64 (MIRA 17:8)

MINAKOV, V.N.; TREFILOV, V.I.

Spectrometric resolution of a sintillation counter in the recording of soft X rays. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.18:220-221 '64

APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756520002-3"

L 21877-65

GRIDNEV, V.N. [Hridniev, V.H.]; MINAKOV, V.N.; TREFILOV, V.I.

Austenite formation in quick heating of steel. Ukr. fiz. zhur. 9 no.3:318-324 Mr '64. (MIRA 17:9)

1. Institut metallofiziki AN UkrSSR, Kiyev.

... Ge and InSb in a wide ... crystals. It was shown that ...

ACCESSION NR: AT5005114 ... there is no electromechanical effect.

... mobility, there is no ... the dislocations in

MIL'MAN, Yu.V.; TREFILOV, V.I.

Temperature of cold brittleness. Ukr. fiz. zhur. 9 no.7:792-794 Jl '64. (MIRA 17:10)

1. Institut metallofiziki AN UkrSSR, Kiyev.

L 24470-66 EWT(m)/EWP(w)/T/EWP(t) IJP(c) JD/JG/GS

ACC NR: AT6010573 (N) SOURCE CODE: UR/0000/65/000/000/0042/0053

44

43

B+1

AUTHOR: Drachinskiy, A. S.; Trefilov, V. I.

ORG: Institute of Physics of Metals, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Transition from intercrystalline to transcrystalline fracture in molybdenum 18 27

SOURCE: AN UkrSSR. Mekhanizm plasticheskoy deformatsii metallov (Mechanism of the plastic deformation of metals). Kiev, Naukova dumka, 1965, 42-53

TOPIC TAGS: molybdenum, material deformation, material fracture, grain size, phase transition

ABSTRACT: The transition from intercrystalline to transcrystalline fracture is studied in molybdenum specimens produced by electron-beam melting 18 with subsequent extrusion and forging. Tensile tests were done at room temperature at a deformation rate of $1.3 \cdot 10^{-2}$/cm. An oscillograph was used for recording the tensile diagrams and the state of the fracture surface was studied under an optical microscope. A graph is given showing the true breaking stress as a function of grain size. The curve shows a sharp departure from the linear relationship $\sigma_B = f(d^{-1/2})$ at $d^{-1/2} < 3$ $мм^{-1/2}$. A transition to brittle fracture is observed at the same time on the tensile

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ACC NR: AT6010573

diagrams. Microstructural analysis also shows a change in the nature of the fracture. A transition is observed in the region $d^{-1/2} \approx 3$ мм$^{-1/2}$ from transcrystalline fracture (at $d^{-1/2} > 3$ мм$^{-1/2}$) to mixed, and finally (at $d^{-1/2} \approx 3 \div 1,2$ мм$^{-1/2}$) to fracture along grain boundaries. The experimental results indicate that considerable plastic deformation precedes fracture. It is shown that the transition to intergranular fracture is not due entirely to precipitation of brittle phases along the grain boundaries as is the case in the fracture of multicomponent alloys. Some of the experimental data may be explained on the basis of the Zener mechanism of intergranular fracture. According to this model, conditions for development of slippage along grain boundaries become increasingly worse with reduction in grain size. At the same time, accommodation conditions improve so that fracture along grain boundaries finally disappears. Models proposed by D. A. Robins and R. C. Gifkins are also considered. A choice between the various mechanisms studied is impossible on the basis of the available experimental material. Further research in this direction is needed. Orig. art. has: 8 figures.

SUB CODE: 11,20/ SUBM DATE: 14Nov64/ ORIG REF: 009/ OTH REF: 021

Card 2/2 dda

L 24469-66 EWT(m)/ETC(f)/EPF(n)-2/EWG(m)/T/EWP(t) IJP(c) JD/JG/GS

ACC NR: AT6010572 (N) SOURCE CODE: UR/0000/65/000/000/0029/0041

AUTHOR: Mil'man, Yu. V.; Rachek, A. P.; Trefilov, V. I.; Udovenko, A. A.; Firstov, S. A.; Yaremchuk, V. V.

ORG: Institute of Physics of Metals AN UkrSSR (Institut metallofiziki AN UkrSSR)

42 39 B+1

TITLE: Mechanism of plastic deformation in alloys of transition metals 27

SOURCE: AN UkrSSR. Mekhanizm plasticheskoy deformatsii metallov (Mechanism of the plastic deformation of metals). Kiev, Naukova dumka, 1965, 29-41

TOPIC TAGS: plastic deformation, cast alloy, phase transition, twinning, material fracture

ABSTRACT: The paper is a continuation of a previous work (Mil'man, Yu. V., Trefilov, V. I., Rachek, A. P., "Problems in the Physics and Science of Metals, 20", *Naukova dumka*, Kiev, 1964) devoted to the mechanism of plastic deformation and brittle fracture of alloys of elements in group VIA with other transition metals. The following alloy systems are studied: Cr-Mn, Cr-Ru, Cr-Fe, Cr-Os, W-Re, Mo-Re, Nb-Re and Mo-Ti. The alloys were studied in the cast state and in some cases were subjected to heat

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APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756520002-3"

L 24469-66 3
ACC NR: AT6010572

treatment. The relationship between the packing flaw energy and the electronic structure of the alloy is analyzed. It is shown that both transition and nontransition metals conform to the Seger rule on high energies for packing defects in metals. The twinning ⇄ slipping transition in alloys of transition metals is studied. All alloys of elements in group VIA with metals in groups VIIA and VIIIA show a transition to twinning, while alloys with elements in group VIA (Mo-Ti alloys) show no twinning throughout the entire region of solid solutions with a bcc lattice under maximum loads. Experimental data show that alloying chromium, molybdenum and tungsten with metals of groups VIIA and VIII reduces the packing flaw energy and causes a transition to deformation by twinning (or to combined deformation by slipping and twinning). A brief survey of the literature shows no transition to twinning in alloys of group VIA with transition metals to the left of the chromium group in the periodic table. Orig. art. has: 8 figures.

SUB CODE: 11/ SUBM DATE: 14Nov64/ ORIG REF: 003/ OTH REF: 026

Refracting metals
27

Card 2/2 dda

L 42026-66 EWT(m)/EWP(k)/T/EWP(...)/... JD/HW/JG/GD
ACC NR: ... SOURCE CODE: UR/0000/65/000/000/0101/0111

AUTHOR: Gridnev, V. N.; Ivashchenko, R. K.; Mil'man, Yu. V.; Trefilov, V. I.; Firstov, S. A.

53
B+1

ORG: Institute of Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: Investigation of the effect of highly active elements on the plasticity of chromium

SOURCE: AN UkrSSR. Fizicheskaya priroda khrupkogo razrusheniya metallov (Physical nature of brittle failure of metals). Kiev, Izd-vo Naukova dumka, 1965, 101-111

TOPIC TAGS: chromium, plasticity, metal aging, yttrium, rare earth element

ABSTRACT: The article deals with the refining of chromium by treatment with highly active elements which react with the interstitial impurities in Cr to form more stable compounds than the corresponding Cr compounds. To this end, the use of Y and other rare-earth elements is particularly promising since then it is often possible to improve not only the plasticity but also the high temperature strength of the alloy. However, there is no common consensus on this effect of Y and rare-earth elements. Thus, O. N. Carlson et al. (Less Common Metals, 1964, 6, 6, 439) present experimental findings indicating that the temperature of cold brittle-

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L 41026-66

ACC NR: AT6009600

ness of cast Cr increases when it is treated with Y and other rare-earth elements. To clear up this contradiction, specimens of Cr treated with Y as well as of pure Cr in soldered and evacuated ampoules were annealed at 1200°C for 1 hr and water-quenched. By means of Vickers hardness tests, aging of these specimens was investigated at three temperatures (275°, 350° and 400°C) in a molten-tin bath. The findings on the increase in microhardness with aging are presented in Fig. 1, where each point represents the mean of 8-10 measurements. Fig. 1

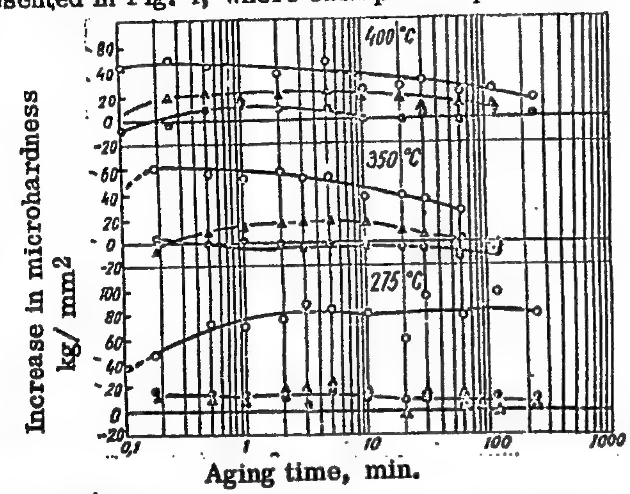

Fig. 1. Effect of treatment with Y and Pr on the aging of Cr:

○ - zone-refined Cr; ● - alloy of Cr + 1% Y; △ - alloy of Cr + 1% Pr

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L 41026-66

ACC NR: AT6009600

indicates that the addition of Y virtually suppresses the processes of aging in the alloy (and hence also it suppresses the rise in the temperature of cold brittleness due to the segregation of an interstitial impurity -- nitrogen -- from the solid solution). These findings confirm the feasibility of using Y to improve the refining of Cr, since Y binds the greater part of nitrogen into nitrides, thus suppressing most of the effects of aging. Further tests, involving the treatment of Cr with microamounts of Y and Pr over a broad temperature range: from the temperature of liquid hydrogen to +900°C, showed, that such treatment enhances the microhardness of Cr at elevated temperatures. Orig. art. has: 5 figures.

SUB CODE: 13, 11, 20/ SUBM DATE: 12Oct64/ ORIG REF: 005/ OTH REF: 026/

Card 3/3 hs

L 04183-67 EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG/GD
ACC NR: AT6026909 SOURCE CODE: UR/0000/66/000/000/0056/0062

AUTHOR: Belous, O. A.; Gridnev, V. N.; Yefimov, A. I.; Mil'man, Yu. V.; Trefilov, V. I.

60
56
B+1

ORG: none

TITLE: The effect of annealing temperature on Q^{-1} and G-purity chromium and alloys of chromium with yttrium and gadolinium

SOURCE: AN SSSR. Institut metallurgii. Vnutrenneye treniye v metallakh i splavakh (Internal friction in metals and alloys). Moscow, Izd-vo Nauka, 1966, 56-62

TOPIC TAGS: internal friction, annealing, temperature dependence, chromium, high purity metal, yttrium, gadolinium, metallographic examination, grain structure, dislocation effect

ABSTRACT: The effect of annealing temperature on temperature dependent internal friction was studied in zone melted chromium, Cr + 1% Y, and Cr + 1% Gd. Wire samples of 0.8 mm diameter were drawn at 300°C to about 95%. These wires were annealed before testing for 1 hr at temperatures ranging from 100 to 1100°C. At low testing temperatures the internal friction in the pure chromium was twice as low as that in the alloys. In all cases, the internal friction decreased as a function of annealing temperature; in zone refined chromium, the internal friction dropped from $15 \cdot 10^{-4}$ to $5 \cdot 10^{-4}$ after annealing to 300°C; in Cr + 1% Y, the internal friction decreased at 50°C after

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ACC NR: AT6026909

annealing up to 600°C. These changes were partially caused by the redistribution of interstitial impurities during annealing. Transmission electron microscopy showed that the density and distribution of dislocations did not change after annealing up to 400°C. Thus in the alloys the internal friction decrease was caused by polygonization. Microstructures did not show any differences between pure chromium and the alloys that would account for the internal friction recovery. At high testing temperatures, the internal friction increased sharply due to grain boundary relaxation. The rise in internal friction at high temperatures was the same for all of the metals. The shift in initial rise of internal friction with annealing was caused by a decrease in both dislocation density and grain boundary area. After annealing at similar temperatures, the value of internal friction was highest in the alloys, due to the retardation of recrystallization by alloying. In the 300-600°C temperature range, the change in Q^{-1} was caused by polygonization in Cr + 1% Y (the recrystallization temperature of Cr-Y is above 800°C), while in pure chromium above 600°C it was due to recrystallization. Internal friction peaks occurred at 900°C in pure chromium at an oscillation frequency of 2.8 cps. In Cr + 1% Gd a similar grain boundary peak occurred at 960-970°C at a frequency of 2.1 cps. In Cr + 1% Y the peak was not observed because alloying with yttrium raised the peak into a higher temperature range. The temperature dependence of the square of the frequency is proportional to the shear modulus. Deviations from linearity were observed in the same temperature range where the sharp rise in Q^{-1} was observed. This change in shear modulus was caused by grain boundary relaxation and lat-

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ACC NR: AT6026909

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tice inhomogeneity. The authors express their gratitude to V. G. Epifanov of the Institute of Metal Physics, AN UkrSSR for supplying the zone melted chromium, produced by three zone passes. Orig. art. has: 4 figures. 16

SUB CODE: 11,20/ SUBM DATE: 02Apr65/ ORIG REF: 011/ OTH REF: 008

Card 3/3 ZC

ACC NR: AP6033049 SOURCE CODE: UR/0126/66/022/002/0227/0233

AUTHOR: Yefimov, A. I.; Kushnareva, N. P.; Statkevich, V. N.; Trefilov, V. I.

ORG: Institute of Physics of Metals, AN UkrSSR (Institut metallofiziki AN UkrSSR); Electric Welding Institute im. Ye. O. Paton, AN UkrSSR (Institut elektrosvarki AN UkrSSR)

TITLE: Structure sensitivity of plastic properties of electron beam melted molybdenum alloys

SOURCE: Fizika i metallov i metallovedeniye, v. 22, no. 2, 1966, 227-233

TOPIC TAGS: molybdenum, molybdenum alloy, molybdenum alloy structure, molybdenum alloy, plasticity, METAL CRYSTAL

ABSTRACT: Specimens of electron-beam melted molybdenum and Mo-C-Ti and Mo-B-Ti alloys have been subjected to bending tests in the as-cast and annealed (in vacuum at 2000C for 1 hr) conditions. It was found that the plasticity of molybdenum alloys depends, to a great degree, on their structure. Specimens of pure molybdenum and Mo-C-Ti alloy cut from the ingots along their longitudinal axes had crystals positioned in the lengthwise direction and they were plastic. As-cast pure

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ACC NR: AP6033049

molybdenum longitudinal specimens withstood bending to 180°, without failure, while annealed specimens failed at 150° in a transcrystalline manner. Specimens of Mo-C-Ti alloy broke at a 150—160° bending angle with a fracture along the grain. Specimens of pure molybdenum and Mo-C-Ti alloy cut across the ingot axis were predominantly brittle and broke at 0°, with the exception of annealed specimens which broke at 70—90°. All longitudinal and crossectional specimens of Mo-B-Ti alloy were brittle, showing predominantly transcrystalline fracture. It was established that alloys with high plasticity have clearly developed fragmentation and a disorientation of substructure fragments of 2—4°. Orig. art. has: 4 figures and 1 table.

SUB CODE: 11/ SUBM DATE: 22Dec65/ ORIG REF: 010/ OTH REF: 018

Card 2/2

ACC NR: AP7005136 SOURCE CODE: UR/0126/66/022/004/0611/0616

AUTHOR: Trefilov, V. I.; Firstov, S. A.

ORG: Institute of Metal Physics, AN UkrSSR (Institut metallofiziki AN UkrSSR)

TITLE: A study of deformation and crack formation in thin chromium foils

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 4, 1966, 611-616

TOPIC TAGS: chromium, thin film, brittleness, material fracture, electron microscopy, plastic deformation, crystal dislocation, grain structure, CRACK PROPAGATION

ABSTRACT: Electron microscopy was used to study deformation and crack formation in thin chromium foils. The chromium foils were made from ingots which were arc melted in argon. Circular, self-supporting samples were made from discs which were gradually thinned toward the center (thinnest section), and cracks were induced at the center by pricking the disc near the edge. This method allowed various stages of deformation as well as crack formation to be studied. An electron micrograph showed slip traces caused by the intersection of mobile dislocations with the oxide layer formed by electron bombardment. These slip traces were identified with surface interactions. Dislocations accumulated in the slip planes along the boundaries of the foil as a result of retarded motion. Three slip planes were observed: {110}, {112}, and {123}. Aging the foils at room temperature or heating to 350°C in the microscope column did not af-

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ACC NR: AP7005136

fect the microstructures. Electron micrographs were also given of fractured center sections of the sample disc. Both intercrystalline and transcrystalline cracks formed. Cracks along grain boundaries did not result in much plastic deformation in neighboring areas. It was hypothesized that these were caused by dislocations moving at stresses below the elastic limit of the material, accumulating in grain boundaries, and nucleating as cracks at well below the elastic limit. Interactions of transcrystalline cracks with grain boundaries also occurred. Cracks penetrating into the thicker sections of the foil were bent at the point where the crack stopped propagating. This region showed heavy plastic deformation. The slip plane reactions necessary to form cracks (Cottrell mechanism) were outlined by slip traces in the foil which adjoined the crack edges. Slip planes and directions were given for microcrack nucleation in the foils. The microcracks lay along the {112} plane and did not have the orientations necessitated by the Cottrell mechanism. In utilizing these results in foils it is necessary to consider the details of deformation in foils, particularly the stress state and surface effects. Orig. art. has: 5 figures, 1 table, 1 formula.

SUB CODE: 11,20/ SUBM DATE: 09Nov65/ ORIG REF: 009/ OTH REF: 006

MIL'MAN, Yu.V.; TREFILOV, V.I.; KHOMENKO, G.Yo.

Temperature dependence of the electromechanical effect in covalent crystals. Sbor.nauch.trud. Inst. metallofiz. AN URSR no.19:51-53 '64. (MIRA 18:5)

MIL'MAN, Yu.V.; RACHEK, A.P.; TREFILOV, V.I.

Investigating the mechanism of deformation and brittle failure of transition metal alloys on a base of the group VIA metals. Sbor. nauch. trud. Inst. metallofiz. AN URSR no.20:3-24 '64. (MIRA 18:5)

GRIDNEV, V.N.; IVASHCHENKO, R.K.; MIL'MAN, Yu.V.; TREFILOV, V.I.

Plasticity of chromium alloyed with yttrium. Sbor. nauch. trud. Inst. metallofiz. AN URSR no.20:25-31 '64.

(MIRA 18:5)

LOTSKO, D.V.; TREFILOV, V.I.

X-ray study of the defects of packing in metals with a body-centered cubic lattice. Fiz. met. i metalloved. 19 no.6:891-898 Je '65. (MIRA 18:7)

1. Institut metallofiziki AN UkrSSR.

MIL'MAN, Yu.V.; TREFILOV, V.I.

Nature of the "yield tooth." Sbor.nauch.trud. Inst.metallofiz. AN URSR no.19:46-50 '64. (MIRA 18:5)

DRACHINSKIY, A.S.; MOISEYEV, V.F.; TREFILOV, V.I.

Conditions for the transition from slip to twinning. Fiz. met. i metalloved. 19 no.4:602-611 Ap '65. (MIRA 18:5)

1. Institut metallofiziki AN UkrSSR.

GRIDNEV, V.N. [Hridnev, V.N.]; RAFALOVSKIY, V.A. [Rafalovs'kyi, V.A.]; TREFILOV, V.I.

Physical properties of the β-phase in titanium alloys with transition elements. Ukr. fiz. zhur. 9 no.11:1269-1270 N '64 (MIRA 18:1)

1. Institut metallofiziki AN UkrSSR, Kiyev.

RAFALOVSKIY, V.A. [Rafalovs'kyi, V.A.]; TREFILOV, V.I.

Magnitude of coupling forces in ω-phases. Ukr. fiz. zhur. 9 no.11:1270-1271 N '64 (MIRA 18:1)

1. Institut metallofiziki AN UkrSSR, Kiyev.